Cellulose acetate

Synonym:
Acetate

Monomers:
Base monomer unit glucose

Related Polymers:
Cellulose II
Cellulose acetate propionate
Cellulose acetate butyrate
Cellulose triacetate

Material Class
Polysaccharides

Polymer Type:
cellulosics

CAS Reg. No.:
9004-35-7

Molecular Formula:
$(C11\text{-}12H15\text{-}16O7.5\text{-}8)_n$

General Info:
Thermoplastic polymer with excellent optical props.

Volumetric and Calorimetric Properties

Density:

No.	Value	Note
1	1.26 g/cm³	varies with degree of acetylation [8]
2	1.28 g/cm³	[1]
3	1.3 – 1.31 g/cm³	[2]

Thermal Expansion Coefficient:

No.	Value	Note
1	0.00008 – 0.00018 K^{-1} [L]	mould [3]
2	0.0001 – 0.00015 K^{-1} [L]	sheet [3]
3	0.00012 K^{-1} [L]	ASTM D696 [8]
4	0.00014 K^{-1} [L]	[4]

Thermodynamic Props General:
Heat of combustion 17179 kJ kg^{-1}

Thermal Conductivity:

No.	Value	Note
1	0.17 – 0.34 W/m K	[3,8]

Specific Heat Capacity:

No.	Value	Note
1	1.26 – 1.76 kJ/(kg °C) [P]	moulding [1,9]
2	1.26 – 2.09 kJ/(kg °C) [P]	sheet [1,9]
3	1.26 – 1.67 kJ/(kg °C) [P]	23°, ASTM C177 [8]

Melting Temperature:

No.	Value	Note
1	230°C	[3]
2	235 – 255°C	[2]

Deflecti n Temperatures:

No.	Value	Note
1	44 – 113°C	1.82 MPa, ASTM D648 [1]
2	44 – 91°C	1.82 MPa, moulding [3]
3	49 – 98°C	0.455 MPa
4	55 – 118°C	0.455 MPa, ASTM D648 [1]
5	57°C	1.82 MPa, ASTM D648 [8]
6	61°C	0.0383 Mpa
7	70°C	0.0455 MPa
8	72°C	0.0096 MPa, ASTM D648 [4]

Vicat Softening Point:

No.	Value	Note
1	70°C	[5]

Surface Properties and Solubility

Plasticisers:
Diglycerol ethers

Solvents/Nonsolvents:
Sol. ketones, esters and alcohols (ASTM D543) [5]. Liq. cryst. trifluoroacetic acid/CH_2Cl_2

Surface Tension:

No.	Value	Note
1	45.9 mN/m	20°, polarity 0.296 [13,14]

Transport Properties

Water Absorption:

No.	Value	Note
1	3 – 8.5%	[2]

Gas Permeability:

No.	Value	Note
1	18.4 cm^3/m^2 atm day [N_2]	$0.28 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 30° [3]
2	51.2 cm^3/m^2 atm day [O_2]	$0.78 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 20° [3]
3	183.9 cm^3/m^2 atm day [Hexane]	$2.8 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 35° [3]
4	229.8 cm^3/m^2 atm day [H_2]	$3.5 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 20° [3]
5	229.8 cm^3/m^2 atm day [H_2S]	$3.5 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 30° [3]
6	245.6 cm^3/m^2 atm day [CCl_4]	$3.74 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 35° [3]
7	446.5 cm^3/m^2 atm day [Bromomethane]	$6.8 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 60° [3]
8	893 cm^3/m^2 atm day [He]	$13.6 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$ [3]
9	1116.3 cm^3/m^2 atm day [Ethylene oxide]	$17 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 0° [3]
10	33621 cm^3/m^2 atm day [C_6H_6]	$512 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 35° [3]
11	195685 cm^3/m^2 atm day [EtOH]	$2980 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 35° [3]
12	236069 cm^3/m^2 atm day [EtOAc]	$3595 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 35° [3]
13	361163 cm^3/m^2 atm day [H_2O]	$5500 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$, 20° [3]

Mechanical Properties

Tensile M dulus:

No.	Value	Note
1	2174 MPa	ASTM D638 [4]
2	2800 – 3000 MPa	2.8-3.0 • 10^{10} dyne cm^{-2}, DS 1.87-2.99 [6]

Flexural Modulus:

No.	Value	Note
1	1449 MPa	ASTM D790 [4]
2	1749 MPa	ASTM D790 [4]

Tensile Strength at Break:

No.	Value	Note
1	5.5 – 41.4 MPa [50-56%]	70°, ASTM D638 [1,9]
2	13.5 – 58.6 MPa	23°, ASTM D638 [1,9]
3	75 MPa [15-55%]	film [2]

Elastic Moduli:

No.	Value	Note
1	620.7 – 1793 MPa [Flexural modulus]	ASTM D790 [1,9]
2	1310 MPa	ASTM D790 [8]

Tensile Strength at Yield:

No.	Value	Note
1	13.8 – 48.3 MPa	73°, ASTM D638 [1,9]
2	15.2 – 51 MPa	sheet [3]
3	22.8 MPa [30%]	ASTM D638 [8]
4	28.3 – 52.4 MPa	mould [3]

Flexural Strength at Yield:

No.	Value	Note
1	13.8 – 110.3 MPa	ASTM D790 [1,10]
2	13.8 – 110 MPa	mould [3]
3	33.1 MPa	ASTM D790 [8]
4	41 – 68.9 MPa	sheet [3]

Compressive Strength:

No.	Value	Note
1	13.1 – 64.1 MPa	ASTM D695 [1,10]

Hardness:
Rockwell R39-R120 (ASTM D785) [1], R100-R123 (moulding) [3], R85-R120 (sheeting) [3], R82 (ASTM D785) [4]

Failure Properties General:
Deformation under load 40-1% (13.79 MPa), 15-1% (6.90 MPa, ASTM D621) [1]. Tear strength 1.6-3.9 N mm^{-1} (film) [2]. Burs strength (M≅ullen) 30-60 [2]

Izod:

No.	Value	Note
1	1.9 – 14.3 J/m [No]	-40°, ASTM D758 [1,9]
2	53 – 214 J/m [No]	23°, mould [3]
3	59 J/m [Yes]	-40°, ASTM D256 [8]
4	107 – 454 J/m [No]	23°, sheet [3]
5	132.7 – 136.6 J/m [No]	23°, ASTM D256 [1,9]
6	235 J/m [Yes]	23°, ASTM D256 [8]

Optical Properties

Surface Resistivity:

No.	Value	Note
1	0.68 10^{15} ohm	ASTM D257 [8]

V lume Resistivity:

No.	Value	Note
1	0.0001 – 0.01 10^{15} ohm cm	ASTM D257 [1,9]
2	0.01 – 1 10^{15} ohm cm	ASTM D257 [8]
3	0.016 10^{15} ohm cm	ASTM D257 [8]

C mplex Permittivity and Electroactive Polymers:
Zeta potential 52 mV (cellulose acetate fibre, H_2O) [12]

Dielectric Strength:

No.	Value	Note
1	0.25 – 0.365 kV/mm	0.125 cm thick [1,9]
2	9 – 24 kV/mm	mould [3]
3	11 – 24 kV/mm	sheet [3]
4	13.4 kV/mm	ASTM D149 [4]
5	14.5 kV/mm	ASTM D149 [8]
6	126 – 197 kV/mm	sheet [2]

Dielectric/Permittivity Constant:

No.	Value	Note
1	3.2 – 7 [1 MHz]	ASTM D150 [5]
2	3.2 – 7 [1 MHz]	sheet [3]
3	3.2 – 7 [1 MHz]	mould [3]
4	3.4 – 7.4 [60 Hz]	sheet [3]
5	3.5 – 7.5 [60 Hz]	mould [3]
6	3.5 [1 MHz]	ASTM D150 [8]

Optical Properties

Optical Properties General:
Uv light screening <99% absorbed (ASTM E308) [8]

Refractive Index:

No.	Value	Note
1	1.46 – 1.5	25°, ASTM D542 [1,9]
2	1.46 – 1.5	mould [3]
3	1.46 – 1.49	ASTM D542 [8]
4	1.49 – 1.5	sheet [3]

T tal Internal Reflect:
$[\alpha]^{20}_{D}$ +12.6 (MeCN), +5.15 (Me_2CO), -10.0 (dioxan), -26.0 (pyridine) [7]

V lume Properties/Surface Properties:
Light transmittance 88% (sheet) [3], <90% (sheet, 1.52 mm thick, ASTM E308) [8]. Haze <1% (sheet) [3]. Haze <8.5% (sheet, 1.52 mm thick, ASTM D1003) [8]

Stability

P lymer Stability General:
Aq. potassium or calcium iodide stabilises the polymer against thermal degradation and discoloration during processing.

Upper Use Temperature (Long Term):

No.	Value	Note
1	-26°C	film [2]
2	79°C	film [2]

Decompositi n Details:
Weight loss in accelerated ageing of 0.4-12.0% (82°, 72h, ASTM D706) [1,2]

Flammability:
1.27-5.08 cm min^{-1} (ASTM D635) [1]

Chemical Stability:
Stable to chlorine bleach and to dilute acids and alkalis. Decomposed by strong mineral acids and alkalis, particularly at highe temps. [1]

Applications/Commercial Products

Pr c/Manuf Routes:
Cellulose fibres (or cellulose dissolved in *N,N*-dimethylacetamide-LiCl) is treated with Ac_2O in AcOH, using sulfuric acid as catalyst. Water is added to terminate the reaction. Partial hydrol. of acetyl groups can also be achieved to give a range of products. The product is collected by precipitation into water or dil. AcOH

M ld Shrinkage:

No.	Value	Note
1	0.2 – 0.6%	ASTM D955

Applications:
Fibres, films, plastics, liquid crystals, cigarette filters, packaging

Tradenames:

Tradenames	Grade	Manufacturer/Supplier
		Hoechst Celanese
Acety		Diacel Chem. Ind.
CA700	various grades	Albis Corp.
Cellidor S		Bayer Inc.
Dexel		
H/H2/H3/H4		Rotuba
M/MH/MS		Rotuba
Tenite acetate		Eastman Chemical Company

References

[1] Encycl. Polym. Sci. Eng., 2nd edn., (eds. H.F. Mark, N.M. Bikales, C.G. Overberger and G. Menges), John Wiley and Sons, 1985, 3

[2] Kirk-Othmer Encycl. Chem. Technol., 4th edn., (ed. J.I. Kroschwitz), Wiley Interscience, 1993, 5,.

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Cellulose triacetate

Monomers:
Base monomer unit glucose

Material Class
Polysaccharides

P lymer Type:
cellulosics

CAS Reg. No.:
9012-09-3

Molecular Formula:
$(C12H16O8)_n$

Fragment:
C12H16O8

Mol. Weight:
DP 300 (fibres). Degree of substitution greater than or equal to 2.8

Volumetric and Calorimetric Properties

Density:

No.	Value	Note
1	1.27 – 1.29 g/cm³	[1]
2	1.3 g/cm³	fibres [1]

Therm dynamic Props General:
Heat of combustion 17598 kJ kg^{-1} [7]

Melting Temperature:

No.	Value	Note
1	265 – 295°C	[3]

Glass Transition Temperature:

No.	Value	Note
1	49 – 478°C	[9]

Transition Temperatures:

No.	Value	Note
1	130°C [Crystalline rearrangement]	in steam [4]
2	195°C [Crystalline rearrangement]	[4]
3	310 – 315°C [Decomposition temp.]	[1]

Surface Properties and Solubility

Solvents/Nonsolvents:
Sol. CH_2Cl_2, formic acid, glacial AcOH. Slightly sol. dioxan, Me_2CO. Insol. hydrocarbons, C_6H_6, toluene, CCl_4, tetrachloroethene [4]. Liq. crystal sol. trifluoroacetic acid/water [8]. Swollen by H_2O [1], dichloroethene, trichloroethene [4]

Transport Properties

Water Content:
Water retention capacity 16-17% [1], 10% (after heat setting) [4]

Water Absorption:

No.	Value	Note
1	2.5%	after heat setting [4]
2	4 – 4.5%	20°, 65% relative humidity [1]

Mechanical Properties

Tensile Strength at Break:

No.	Value	Note
1	86 MPa [10-50% [10]]	
2	98.1 – 117.7 MPa	10-12 kg mm^{-2}, foil, transverse [1]
3	117.78 – 235.3 MPa	12-24 kg mm^{-2}, foil, longitudinal [1]
4	137.39 – 245.2 MPa	14-25 kg mm^{-2}, fibres [1]

Viscoelastic Behavior:
Viscoelastic behaviour has been reported [3]

Failure Properties General:
Tear strength 1.6-11.8 N mm^{-1} [10]. Burst strength (Mullen) 50-70 [10]

Electrical Properties

Electrical Properties General:
Specific resistance 10^{13}-10^{15} Ω cm [1]

Volume Resistivity:

No.	Value	Note
1	0.01 10^{15} ohm cm	[10]

Complex Permittivity and Electroactive Polymers:
Zeta potential 37 mV (H_2O) [9]

Dielectric Strength:

No.	Value	Note
1	1.46 kV/mm	[10]

Dielectric/Permittivity Constant:

N .	Value	Note
1	3 – 4.5 [50-60 Hz]	[1]
2	4	[10]

Dissipation Factor:

No.	Value	Note
1	0.01 – 0.02 [50-60 Hz]	[1]
2	0.016	[10]

Optical Properties

Refractive Index:

No.	Value	Note
1	1.469	fibres, along axis [1]
2	1.472	fibres, transverse to axis [1]

Total Internal Reflect:
$[\alpha]_D$ -22.5 ($CHCl_3$) [2]. Double refraction -0.003 [1]

V lume Pr perties/Surface Properties:
Appearance yellowish flakes [2]

Stability

P lymer Stability General:

Thermal Stability General:
Crystallinity increases after heating at 240° for 1 min. [6]

Upper Use Temperature (Long Term):

No.	Value	Note
1	175°C	[10]

Decomposition Details:
Thermal decomposition range 230-320°. Decomposes to give gaseous products together with acetylated derivatives of D-glucose [5]

Bi logical Stability:
Resistant to microorganisms (similar to polyesters and nylon) [6]

Chemical Stability:
Fibres are resistant to slightly acid/alkaline conditions at ambient temp. Resistant to chlorine bleaches. Decomposed by strong mineral acids [6]

References

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Cellulose acetate butyrate

M nomers:
Base monomer unit glucose

Related P lymers:
Cellulose II
Cellulose acetate
Cellulose acetate propionate

Material Class
Polysaccharides

P lymer Type:
cellulosics

CAS Reg. No.:
9004-36-8

General Info:
Composition by weight: Ac 13-15%, Butyrate 36-38%, H 1-2%. Commercial grades: Ac 6-29.5%, Butyrate 17-48%, H 1-2.5%. Commercial grades (lacquers, plastics and coatings): Degree of substitution Ac: Bu: H = 0.5-2.1: 0.7-2.3: 0.2-0.5.

Volumetric and Calorimetric Properties

Density:

No.	Value	Note
1	1.15 – 1.22 g/cm³	ASTM D792 [1]
2	1.19 g/cm³	ASTM D792 [2,5]

Thermal Expansion Coefficient:

No.	Value	Note
1	0.00011 – 0.00016 K^{-1} [L]	ASTM D696 [1]
2	0.00012 K^{-1} [L]	ASTM D696 [5]

Equati n of State:
Equation of state information has been reported [9]

Thermal Conductivity:

No.	Value	Note
1	0.16 – 0.33 W/m K	ASTM C177 [1,6]

Specific Heat Capacity:

No.	Value	Note
1	1.2 – 1.6 kJ/(kg °C) [P]	ASTM C177 [1,6]

Melting Temperature:

No.	Value	Note
1	140°C	[4]

Deflecti n Temperatures:

No.	Value	Note
1	50 – 99°C	1.82 MPa, ASTM D648 [1]
2	59.5 – 112°C	0.455 MPa [1]
3	65°C	0.038 MPa [2]
4	72°C	0.0096 MPa, ASTM D648 [2]
5	74°C	1.82 MPa [5]
6	85°C	0.455 MPa, ASTM D648 [5]

Vicat S ftening Point:

No.	Value	Note
1	70°C	[6]

Surface Properties and Solubility

S lubility Properties General:
Compatible with polyester, acrylic, vinyl and alkyd resins [1]

S lvents/Nonsolvents:
Sol. ketones, esters and alcohols (ASTM D543) [6]

Surface Tension:

No.	Value	Note
1	34 mN/m	20° [10,11]

Transport Properties

Water Absorption:

No.	Value	Note
1	1 – 4%	24h, ASTM D570 [1]
2	1.5%	24h, ASTM D570 [2]

Gas Permeability:

No.	Value	Note
1	320.7 cm^3/m^2 atm day [O_2]	$4.61 \bullet 10^{-10}$ cm^2 $(s\ cmHg)^{-1}$ [7]

Mechanical Properties

Tensile Modulus:

No.	Value	Note
1	1725 MPa	ASTM D638 [2]

Flexural Modulus:

N .	Value	Note
1	482.8 – 1379 MPa	ASTM D790 [1]
2	1449 MPa	ASTM D790 [2]

Tensile Strength at Break:

No.	Value	Note
1	8.3 – 39.3 MPa	70°, ASTM D638 [1,3]
2	13.8 – 51.7 MPa	23°, ASTM D638 [1,3]
3	34.5 MPa [50%]	ASTM D638 [2]

Elastic Moduli:

No.	Value	Note
1	1379 MPa	ASTM D790 [5]

Tensile Strength at Yield:

No.	Value	Note
1	10.3 – 48.3 MPa	73°, ASTM D638 [1,3]

Flexural Strength at Yield:

No.	Value	Note
1	10.3 – 64.1 MPa	ASTM D790 [1,3]
2	12.4 – 64.1 MPa	moulding [4]
3	27.6 – 62 MPa	sheet [4]

C mpressive Strength:

No.	Value	Note
1	7.6 – 52.4 MPa	ASTM D695 [1,3]

Hardness:
Rockwell 29-117 (ASTM D785) [1]. Rockwell R75 (ASTM D785) [2]

Failure Properties General:
Deformation under load 40-1% (13.79 MPa), 15-1% (6.90 MPa, ASTM D621) [1]

Iz d:

No.	Value	Note
1	53 – 582 J/m [Yes]	23°, moulding [4]
2	96 J/m [Yes]	-40°, ASTM D256 [5]
3	133 – 288 J/m [Yes]	23°, sheet [4]
4	187 J/m [Yes]	ASTM D256 [2]
5	240 J/m [Yes]	23°, ASTM D256 [5]

Optical Properties

Surface Resistivity:

No.	Value	Note
1	14 10^{15} ohm	ASTM D257 [5]

Volume Resistivity:

No.	Value	Note
1	0.00001 – 0.001 10^{15} ohm cm	[1,3]
2	1.6 10^{15} ohm cm	ASTM D257 [5]

Dielectric Strength:

No.	Value	Note
1	0.25 – 0.4 kV/mm	0.125 cm thick, ASTM D149 [1,3]
2	16.6 kV/mm	ASTM D149 [5]

Optical Properties

R fractive Index:

No.	Value	Note
1	1.46 – 1.49	25°, ASTM D542 [1,3]

V lume Properties/Surface Properties:
Light transmittance <90% (sheet, 1.52 mm thick, ASTM E308) [5]. Haze <8.5% (sheet, 1.52 mm thick, ASTM D1003) [5]

Stability

P lymer Stability General:

Dec mposition Details:
Weight loss in accelerated ageing of 0.1-4.0% at 82° over 72h (ASTM D706) [1]

Flammability:
1.27-3.81 cm mm^{-1} (ASTM D635) [1,3]

Chemical Stability:
Decomposed by strong acids and alkalis; slightly decomposed by weak acids and alkalis (ASTM D543) [6]

Applications/Commercial Products

M ld Shrinkage:

No.	Value	Note
1	0.2 – 0.4%	ASTM D955

Applications:
Sheeting, moulding plastics, films, lacquers, dip coatings

Tradenames:

Tradenames	Grade	Manufacturer/Supplier
Cellidor B		Bayer Inc.
Tenite butyrate		Eastman Chemical Company

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[2] Handbook of Plastic Materials and Technology, (ed. I.I. Rubin), Wiley Interscience, 1990,.

[3] Physical and Chemical Properties of Triacetate Filaments, Yarns and Staple Fibres, Tech. Bull. TBT 30, Celanese Fibres Mktg. Co., Charlotte, NC, USA, 1974, (technical datasheet).

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Cellulose triacetate

M nomers:
Base monomer unit glucose

Material Class
Polysaccharides

Polymer Type:
cellulosics

CAS Reg. No.:
9012-09-3

Molecular Formula:
$(C12H16O8)_n$

Fragment:
C12H16O8

Mol. Weight:
DP 300 (fibres). Degree of substitution greater than or equal to 2.8

Volumetric and Calorimetric Properties

Density:

No.	Value	Note
1	1.27 – 1.29 g/cm³	[1]
2	1.3 g/cm³	fibres [1]

Thermodynamic Props General:
Heat of combustion 17598 kJ kg^{-1} [7]

Melting Temperature:

No.	Value	Note
1	265 – 295°C	[3]

Glass Transition Temperature:

No.	Value	Note
1	49 – 478°C	[9]

Transiti n Temperatures:

No.	Value	Note
1	130°C [Crystalline rearrangement]	in steam [4]
2	195°C [Crystalline rearrangement]	[4]
3	310 – 315°C [Decomposition temp.]	[1]

Surface Properties and Solubility

S lvents/Nonsolvents:
Sol. CH_2Cl_2, formic acid, glacial AcOH. Slightly sol. dioxan, Me_2CO. Insol. hydrocarbons, C_6H_6, toluene, CCl_4, tetrachloroethene [4]. Liq. crystal sol. trifluoroacetic acid/water [8]. Swollen by H_2O [1], dichloroethene, trichloroethene [4]

Transport Properties

Water C ntent:
Water retention capacity 16-17% [1], 10% (after heat setting) [4]

Water Absorption:

No.	Value	Note
1	2.5%	after heat setting [4]
2	4 – 4.5%	20°, 65% relative humidity [1]

Mechanical Properties

Tensile Strength at Break:

No.	Value	Note
1	86 MPa [10-50% [10]]	
2	98.1 – 117.7 MPa	10-12 kg mm^{-2}, foil, transverse [1]
3	117.78 – 235.3 MPa	12-24 kg mm^{-2}, foil, longitudinal [1]
4	137.39 – 245.2 MPa	14-25 kg mm^{-2}, fibres [1]

Viscoelastic Behavior:
Viscoelastic behaviour has been reported [3]

Failure Properties General:
Tear strength 1.6-11.8 N mm^{-1} [10]. Burst strength (Mullen) 50-70 [10]

Electrical Properties

Electrical Properties General:
Specific resistance 10^{13}-10^{15} Ω cm [1]

V lume Resistivity:

No.	Value	Note
1	0.01 10^{15} ohm cm	[10]

C mplex Permittivity and Electroactive Polymers:
Zeta potential 37 mV (H_2O) [9]

Dielectric Strength:

N .	Value	Note
1	1.46 kV/mm	[10]

Dielectric/Permittivity Constant:

No.	Value	Note
1	3 – 4.5 [50-60 Hz]	[1]
2	4	[10]

Dissipation Factor:

No.	Value	Note
1	0.01 – 0.02 [50-60 Hz]	[1]
2	0.016	[10]

Optical Properties

Refractive Index:

No.	Value	Note
1	1.469	fibres, along axis [1]
2	1.472	fibres, transverse to axis [1]

T tal Internal Reflect:
$[\alpha]_D$ -22.5 ($CHCl_3$) [2]. Double refraction -0.003 [1]

V lume Properties/Surface Properties:
Appearance yellowish flakes [2]

Stability

P lymer Stability General:

Thermal Stability General:
Crystallinity increases after heating at 240° for 1 min. [6]

Upper Use Temperature (L ng Term):

No.	Value	Note
1	175°C	[10]

Decomposition Details:
Thermal decomposition range 230-320°. Decomposes to give gaseous products together with acetylated derivatives of D-glucose [5]

Biological Stability:
Resistant to microorganisms (similar to polyesters and nylon) [6]

Chemical Stability:
Fibres are resistant to slightly acid/alkaline conditions at ambient temp. Resistant to chlorine bleaches. Decomposed by strong mineral acids [6]

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